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09/996,301	11/21/2001	Saad A. Sirohey	GEMS:0180/YOD (120621)	2561
7590	06/29/2005		EXAMINER CHEN, WENPENG	
Tait R. Swanson Fletcher, Yoder & Van Someren P.O. Box 692289 Houston, TX 77269-2289			ART UNIT 2624	PAPER NUMBER

DATE MAILED: 06/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/996,301

Applicant(s)

SIROHEY ET AL.

Examiner

Wenpeng Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-70 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-70 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**Examiner's responses to Applicant's remark**

1. Applicants' arguments and amendments filed 2/18/2005 have been fully considered.

2. Applicants' arguments and amendments overcome the followings set forth in paper #20041105 mailed on 11/12/2004:

- objections to drawings (paragraph 3);
- objections to specification (paragraph 4).

3. Applicants' arguments with regard to rejection to Claim 17 under 35 U.S.C. 112, first paragraph are not persuasive.

Claim 17 depends from Claim 1, and thus includes all the limitations recited in Claim 1. Evidently, Claim 17 comprises at least:

- (1) decomposing the image data into a plurality of data sets using lossless wavelet decomposition;
- (2) tessellating at least one decomposed set of the plurality of data sets into a plurality of blocks;
- (3) dividing each tessellated block into subregions to be individually compressed based upon entropy of each subregion.

The Applicants cited pages 12-14 of the original specification for teaching Claim 17. As one can see that pages 12-14 describe Figs. 3-4. If we assume that Figs. 3-4 teach feature (3)

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above, where in pages 12-14 and Figs. 3-4 teach the above features (1), (2), and (3) all together.

The Applicants are required to map specific portions of the specification is an embodiment for teaching the above listed features (1) to (3), respectively.

Furthermore, Applicants argued that dividing each tessellated block is not necessarily based on the entropy of the subregions. The argument is irrelevant. The Examiner's question is that where in the specification the Applicants also teach "dividing each tessellated block into subregions .... *based upon entropy of each subregion*" required in Claim 17. The Applicants did not answer the question.

4. Applicants' arguments with regard to the following rejections are not persuasive either: (1) rejections to Claims 1-15, 17-34, 36-46, 48-53, and 62-70 under 35 U.S.C. 102(e) as being anticipated by Andrew (US patent 6,763,139) and (2) all the rejections under 35 U.S.C. 103(a) set forth in paper #20041105. The Examiner has thoroughly reviewed Applicants' arguments but firmly believes that the cited reference to reasonably and properly meet the claimed limitation.

Applicants' argument -- All the arguments based on the Applicants allegation that Andrew does not teach "lossless wavelet decomposition" nor "lossless integer wavelet decomposition".

Examiner's response -- The Examiner disagreed with the above conclusion. Andrew as disclosed teaches both "lossless wavelet decomposition" and "lossy wavelet decomposition". Andrew also teaches both "lossless integer wavelet decomposition" and "lossless non-integer wavelet decomposition". The Applicants tried to point the parts related to lossy and non-integer

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decomposition and ignored the Examiner's cited parts for supporting both "lossless wavelet decomposition" and "lossless integer wavelet decomposition".

More specifically, the Examiner cited the passages in column 5, line 7 to column 6, line 11 and column 10, lines 23-37.) In column 6, lines 7-11, Andrew teaches one species having exact reconstruction of discrete wavelet transform (DWT). An exact reconstruction means no loss of data. That requires every step including DWT to be lossless. It is the teaching about said one species meets the requirement of "lossless wavelet decomposition".

With regard to the requirement of "lossless integer wavelet decomposition," Andrew teaches in column 10, lines 23-37 another species using an integer representation for the transform coefficients of the DWT. Using DWT having integer representation and leading to exact reconstruction for decomposition thus results "lossless integer wavelet decomposition". Unless the Applicants define "lossless integer wavelet decomposition" in other way. The Examiner considers the cited passages meet the recited limitations in Claim 1 and Claim 38.

The other arguments for the above listed rejections all based on the allegation. Therefore, the arguments are not persuasive.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 17 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described

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in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification fails to support the following feature recited in Claim 17:

-- dividing each tessellated block into subregions to be individually compressed based upon entropy of each subregion.

The specification never discloses any teaching to wavelet decompose an image, tessellate at least one decomposed set into tessellated blocks, and then further divide each tessellated block into subregions to be individually compressed based upon an entropy of each subregion.

Furthermore, the recitation presented Claim 17 only does not provide adequate description to enable one skilled in the art to implement Claim 17 without experimentation, for example, how to divide a tessellated block into subregions based upon an entropy of each subregion.

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-15, 17-34, 36-46, 48-53, and 62-70 are rejected under 35 U.S.C. 102(e) as being anticipated by Andrew (US patent 6,763,139 cited previously.)

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a. For Claims 1-15 and 17-18, Andrew teaches a method for handling image data, the method comprising:

-- decomposing the image data into a plurality of data sets using lossless wavelet decomposition, wherein decomposing the image data using lossless wavelet decomposition comprises creating a hierarchical set of sub-bands, one set comprising a low frequency component at a lowest resolution level and remaining sets comprising high frequency components at successively higher resolution levels; (column 5, line 7 to column 6, line 11; column 10, lines 23-37; step 103 of Fig. 1; The DWT decomposition can be exactly (lossless) reconstructed.)

-- tessellating at least one decomposed set of the plurality of data sets into a plurality of blocks; (column 6, lines 12-23; Each decomposition is divided into tiles.)

-- compressing each tessellated block of the plurality of blocks using lossless compression; (column 6, line 23 to column 7, line 33; The entropy encoding and Huffman encoding are lossless.)

-- compiling a data stream comprising the compressed plurality of blocks arranged sequentially in a desired order based upon the decomposition and tessellation; (column 8, lines 4-13)

-- wherein the lossless wavelet decomposition comprises lossless integer wavelet decomposition; (column 10, lines 24-37; The transform coefficients are in integer representation.)

-- wherein tessellating comprises using a fixed block size for the plurality of blocks; (column 6, lines 12-23)

-- wherein tessellating comprises addressing each tessellated block with a tessellation index for each dimension of tessellation; (column 6, lines 58-64)

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-- wherein addressing comprises providing a decomposition level index for identifying a desired set of the plurality of data sets; (column 6, line 65 to column 7, line 3; column 8, lines 4-12)

-- selectively transmitting at least a portion of the data stream, wherein selectively transmitting comprises selecting the portion based upon a desired set of the plurality of data sets and a desired group of the plurality of blocks encompassing a region of interest and wherein selecting the portion comprises identifying the desired set and each tessellated block of the desired group using an addressable function; (column 9, lines 22-55; The image data of the selected tiles are transmitted to the decoder for decoding based on the selected resolution and tiles associated with the selected region. The pointer information provides the addressable function.)

-- wherein the data stream comprises a header, which comprises characteristics of the decomposition, the tessellation, and the compression; (column 8, lines 29-48; column 9, lines 13-21, 36-43; The pointer information comprises characteristics of the decomposition and the tessellation.)

-- wherein the data stream comprises a resolution level index for each decomposed set, a tessellation row index for each tessellated block, and a tessellation column index for each tessellated block; (column 8, lines 29-48; column 9, lines 13-21, 36-43; The pointer information inherently needs the labeling information shown in column 8, lines 7-10 for the resolution and tile address to point to the starting point of each tile.)

-- wherein the desired order comprises an order of desired blocks of the tessellated blocks; (column 8, lines 7-10; The sequence shows an order of desired tiles for each decomposition. For example, HL3(0,0) is placed before HL(0,1). Without specified what desired blocks are, the listed tiles are all desired tiles for future decompression.)



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-- storing the data stream based on indices to the decompositions and tessellations, wherein storing the data stream comprises storing each of the compressed plurality of blocks in data groups based on the indices; (column 8, lines 7-10; column 16, lines 57-63; The sequence shows the storing sequence based on the indices. For example, DC90,0) and HL3(0,1) are stored as individual groups, respectively.)

-- wherein the plurality of data sets corresponds to a plurality of resolution levels; (column 8, lines 7-10; DC represents one level. HH3, HL3, LH3 represent another level.)

-- reconstructing an image at least partially from the tessellated blocks; (column 9, lines 22-55)

-- dividing each tessellated block into subregions to be individually compressed based upon entropy of each subregion. (column 11, lines 49 to column 12, line 10; blocks 814, 818, and 820 of Fig. 8; At step 814, when a region is insignificant according to eq(1) of column 11, the value of the considered bit plane in the region is uniformly zero, thus having a low entropy. A set of single-value data has entropy of zero. So the decision at step 814 is inherently entropy-based. When the set of the data of the bit plane in the region has at least one non-zero, namely the entropy is not zero, the region is further divided.)

b. For Claims 19-30, Andrew further teaches:

-- wherein transmitting the data stream comprises transmitting at least part of a desired one of the data sets identified by the decomposition level index, the desired one corresponding to an image resolution relatively higher than a locally stored one of the data sets; (column 8, lines 7-10; The sequence is arranged in the order of degree of resolution.)

-- wherein transmitting comprises transmitting over a network. (column 15, lines 53-64; column 16, lines 57-64)

After comparing Claims 1-15 and 18 and Claims 19-30, it is evidently that the combination of the above cited passages and the passages recited for teaching Claims 1-15 and 18 as discussed above also teaches Claims 19-30.

c. For Claims 31-34 and 36-37, Andrew further teaches:

-- wherein the plurality of resolution levels comprise a lowest resolution level having a low frequency component and a remaining plurality of resolution levels comprising high frequency components; (Fig. 2; column 8, lines 7-10; DC is a lowest resolution level having a low frequency component. The others are the high frequency components.)

-- wherein tessellating at least part of one level comprises tessellating only the high frequency components. (Andrew's teaching includes a special case where the lowest DC band contains only a single pixel. For example, when a 128 x 128 image is decomposed into 7 resolution levels. The highest level is DC having one single element. The HL6, LH6, and HH6 also all have a single element. A single element cannot be tessellated.)

After comparing Claims 1-15 and 18 and Claims 31-34 and 36-37, it is evidently that the combination of the above cited passages and the passages recited for teaching Claims 1-15 and 18 as discussed above also teaches Claims 31-34 and 36-37.

d. For Claims 38-46, and 48, Andrew further teaches:

-- wherein the plurality of resolution levels comprise a lowest resolution level having a low frequency component and a remaining plurality of resolution levels comprising high frequency components; (Fig. 2; column 8, lines 7-10; DC is a lowest resolution level having a low frequency component. The others are the high frequency components.)

-- wherein forming the data stream comprises providing a header having decomposition statistics and tessellation statistics for the plurality of addressable data blocks. (column 8, lines

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29-48; column 9, lines 13-21, 36-43; The pointer information comprises information of Bytes of tile and triplet of tiles that are statistics related to the tessellation and the decomposition, respectively.)

After comparing Claims 1-15 and 18 and Claims 38-44, 46, and 48, it is evidently that the combination of the above cited passages and the passages recited for teaching Claims 1-15 and 18 as discussed above also teaches Claims 38-44, 46, and 48.

e. Claims 49-53 and 62 are the corresponding systems of method described in Claims 1-15 and 18. For Claims 49-53 and 62, Andrew teaches a system (Fig. 12) to implement the methods of Claims 1-15 and 18-30, comprising:

-- an interface comprising circuits that are modules for performing functions of decomposition, tessellation, addressing blocks, compression, storage control, ordering data, and transmitting desired portions described in Claims 1-15 and 18-30;

-- a memory device configured to store the plurality of addressable data blocks. (column 16, lines 57-64)

After comparing Claims 1-15 and 18-30 and Claims 49-53 and 62, it is evidently that the combination of the above cited passages and the passages recited for teaching Claims 1-15 and 18-30 as discussed above also teaches Claims 49-53 and 62.

f. Claims 63-70 are the corresponding computer programs of method described in Claims 1-15 and 18-30. For Claims 63-70, Andrew teaches a machine-readable medium with computer algorithms (column 15, lines 28-52) to implement the methods of Claims 1-15 and 18-30.

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After comparing Claims 1-15 and 18 and Claims 63-70, it is evidently that the combination of the above cited passages and the passages recited for teaching Claims 1-15 and 18-30 as discussed above also teaches Claims 63-70.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 54-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrew (US patent 6,763,139) as applied to Claim 49, and further in view of Cooke, Jr. et al. (US patent 6,574,629 cited previously.)

Andrew teaches the parent Claim 49.

However, Andrew does not teach a picture archiving and communication system (PACS) or imaging systems recited in the above-listed claims.

Cooke teaches PACS system, comprising:

-- a PACS system; (column 33, lines 28-40)

-- an MRI system, a computed tomography system, a positron emission tomography system, a radio fluoroscopy system, a computed radiography system, and an ultrasound system; (Fig. 1; column 9, line 66 to column 10, line 51; column 34, lines 1-20)

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-- compression image data for storage, transmission, and retrieval. (column 9, line 66 to column 10, line 51; column 13, line 61 to column 14, line 5)

It is desirable to decode a localized portion of a medical image efficiently for viewing and analysis. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Andrew's compression system and method to compress various images used in Cooke's PACS system because the combination facilitates retrieval interested regions in medical images for medical analysis.

11. Claims 16, 35, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andrew (US patent 6,763,139) as applied to Claims 1 and 33, and further in view of Sodagar et al. (US patent 6,157,746 cited previously.)

Andrew teaches the parent Claims 1 and 33.

However, Andrew does not teach the feature related different coding for low-frequency and high-frequency components.

Sodagar teaches a wavelet compression system and method, comprising:

-- compressing the high-frequency components using actual values, and compressing the low frequency component at the lowest resolution level using prediction errors. (column 18, lines 3-24)

It is desirable to improve coding efficiency. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Sodagar's teaching of coding Andrew's LL band with predicting error in Andrew's compression system and method because the combination improves coding efficiency of LL band and thus the whole image.

### **Conclusion**

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12. THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). The Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 571-272-7431. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 571-272-7437. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications. TC 2600's customer service number is 571-272-2600.

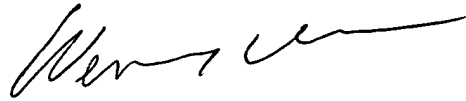
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

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Wenpeng Chen  
Examiner  
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June 15, 2005

A handwritten signature in black ink, appearing to read 'Wenpeng Chen', with a long horizontal flourish extending to the right.